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**S-133-10**

**MINUTEMAN  
WS-133 B**

**REQUIREMENTS  
AND DESCRIPTION**

**WING VI**

**VOLUME 1A**

**INTRODUCTION**

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**USAF** AIR FORCE SYSTEM COMMAND  
BALLISTIC SYSTEMS DIVISION

**D2-30044-1A**

**406 349**

THE **BOEING** COMPANY

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**TECHNICAL PREPARATION BY AGE SYSTEMS ENGINEERING**

DOCUMENT PREPARED BY WING VI DOCUMENTATION

SUPERVISED BY W. J. Dempsey

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APPROVED BY \_\_\_\_\_

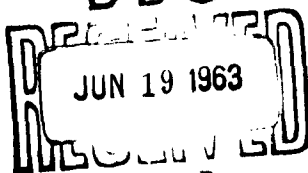
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**SECT.**

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REVISIONS			
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A	Complete Revision to Divide Volume I into Volume IA & 1B	2-15-63	W. J. Dempsey
B	Revised Title Page & Page A. Added Page B In Section I: Added pages 13.1 & 13.2 Revised pages 4, 6, 13 & 16	3-22-63	W. J. Dempsey
C	Complete Revision	5-13-63	<i>W. J. Dempsey</i>

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## INTRODUCTION

### A. PURPOSE

The Weapon System Requirements and Description document series presents a detailed functional description of the WS-133B Weapon System. Its purpose is to identify the equipment, personnel, facilities and data that are necessary components of the Weapon System.

### B. SCOPE

This document series contains the forms, diagrams and drawings developed and approved during the analysis, thus providing source data for all agencies concerned with the development of equipment elements, facilities criteria, personnel and training requirements, technical manual data, provisioning data and logistics planning. In addition to covering the operational Weapon System, Volumes I, II, III, V, VI & VII also contain data for the VAFB Category III Test Program. The VAFB Category III Test Program is a SAC conducted operational evaluation program which is designed to determine and improve the MINUTEMAN force effectiveness. This program is intended to provide data on Weapon System maintenance and operation practices and procedures, proper organizational structures and verification of manpower requirements.

### C. ORGANIZATION

See ILLUSTRATION I.



## FUNCTIONAL ORGANIZATION BY VOLUME

### NOTE

The following notes apply to the diagram on sheet 5.

#### ■ VOLUME I, FUNCTIONAL FLOW DIAGRAMS

The starting point of the System Requirements Analysis is the "Function Identification" process. A function is defined as a discrete identifiable entity causing a particular state or event to occur in the system.

The functional flow diagrams depict these functions and functional interactions which must be performed by airborne and/or ground equipment, or by people, or by some combination of equipment and people to meet the objectives of the Weapon System. Refer to Volume IB, Section IV, for a comprehensive explanation of the mechanics and symbology used on the functional flow diagrams.

#### ■ VOLUME II, SYSTEM FUNCTIONAL ANALYSIS FORM - FORM B

Form B's are developed from each functional flow diagram for each function identified on the flow diagram. The Form B analysis documents the detailed requirements necessary to accomplish the given function, in terms of:

- (1) Equipment
- (2) Facilities, and
- (3) Personnel

A brief explanation of the Form B entries is shown in Illustration 2.

See Volume II, Introduction for a detailed explanation of the Form B entries.

#### ■ VOLUME III, EQUIPMENT DATA FORMS - FIGURE A

The Figure A provides a means for deriving equipment to satisfy technical requirement identified on the Form B's. Identical or similar technical requirements from the Form B's are grouped (Part I) to generate the Figure A's. Part II, Recommended Solution, defines the end-item of equipment. The Figure A has a dual purpose use; (a) to derive operational equipment and (b) to define and substantiate end items of equipment to Air Force technical and procurement personnel. A brief explanation of the Figure A is shown in Illustration 3. See Volume III, Introduction, for a detailed explanation of the Figure A.

## FUNCTIONAL ORGANIZATION BY VOLUME

(Cont'd)

### ■ VOLUME IV, SUBSYSTEM SCHEMATIC BLOCK DIAGRAMS

The block diagrams are analytical models which illustrate the mechanization of the functional flow diagrams. Usages of the subsystem block diagrams are as follows:

- (1) To aid in grouping Form B requirements into Figure A equipment groups.
- (2) To illustrate functional operation of systems.
- (3) To formulate basic requirements for critical MGE items.

See Volume IV, Introduction, for the explanation of the mechanics and symbology used on the subsystem block diagrams.

### ■ VOLUME V, EQUIPMENT MAINTENANCE ANALYSIS (FORM'S C & C<sub>1</sub>)

A Form C is prepared for each system and each system peculiar item identified by a Figure A. Each Form C identifies the maintenance functions necessary to support the equipment developed by the corresponding Figure A. The Form C consists of a matrix type form which contain variable elements of maintenance against which the equipment must be analyzed. The Form C is thus analogous to the flow diagrams in purpose (i. e. The flows serve to identify fixed functions which generate operational equipment; whereas the Form C's serve to identify the variable maintenance functions which in turn generate maintenance equipment.

A Form C<sub>1</sub> is prepared for each Form C, and bears the same relationship to the Form C as the Form B does to the Functional Flow diagram. The Form C<sub>1</sub> documents the detailed requirements necessary to accomplish the given maintenance functions in terms of:

- (1) Equipment
- (2) Facilities, and
- (3) Personnel

A brief explanation of the Form C & C<sub>1</sub> entries is shown in Illustration 4. See Volume V, Introduction, for a detailed explanation of the Form C & C<sub>1</sub> entries.

## FUNCTIONAL ORGANIZATION BY VOLUME (Continued)

### **■ VOLUME VI TECHNICAL MANUAL REQUIREMENTS FORM D'S**

Requirements for Technical Manual coverage, on a functional basis, are generated by the Form B's and Form C<sub>1</sub>'s. These requirements are grouped into appropriate technical manual packages and recommended on the Form D. The purpose of the Form D is thus analogous to the Figure A (i.e. The Figure A is used to define and procure equipment; whereas, the Form D is used to define and procure Technical Manuals for this equipment). A brief description of the Form D entries is shown in Illustration 5. See Volume VI, Introduction, for a detailed explanation of the Form D entries.

### **■ VOLUME VII, TIMELINE FORMS**

The timeline forms are used to perform and record timeline analyses for:

- (1) Operations involving human interface,
- (2) Operations involving time-critical functions,
- (3) All on-site maintenance, and
- (4) Selected activities to be performed by SMSB and MAMS.

The structure of the timelines, wherever possible, matches the structure of the functional flow diagrams.

Usages of the timeline forms are as follows:

- (1) To provide operational reaction time,
- (2) To provide time data necessary to determine the maintenance loading.

The functions for the timeline analysis are obtained from the functional flow diagrams and the Form C's. The personnel tasks are obtained from the Form's B & C<sub>1</sub>.

A brief description of the timeline form is shown in Illustration 6. See Volume VII, Introduction, for a detailed explanation of the timeline form.

### **■ VOLUME VIII, MAINTENANCE LOADING**

Maintenance Loading forms are prepared to cover all job operations involved in On-Site and Support Base Maintenance of OGE MGE & RPIE. These forms are used to determine equipment quantities (including MGE & spares) & personnel load (in man months), for all maintenance. When completed, these forms are the primary tool for evaluating weapon system effectiveness (& down time). A brief description of the Maintenance Loading forms is shown in Illustrations 7, 8 & 9. See Volume VIII, Introduction, for a more detailed explanation of the Maintenance Loading form.

## ILLUSTRATION 1 (SHEET 3 OF 5)

## FUNCTIONAL ORGANIZATION BY VOLUME

(Cont'd)

### **I VOLUME IX, WEAPON SYSTEM DESCRIPTION**

Information developed during the Requirements Analysis is used to provide a description of the Weapon System.

#### **(1) Weapon System Concepts**

- a. Operational Concept
- b. Maintenance Concept

#### **(2) Subsystem Operating Diagrams**

(These diagrams identify equipment down to the Figure A level, and serve to identify the "zero" indentures.)

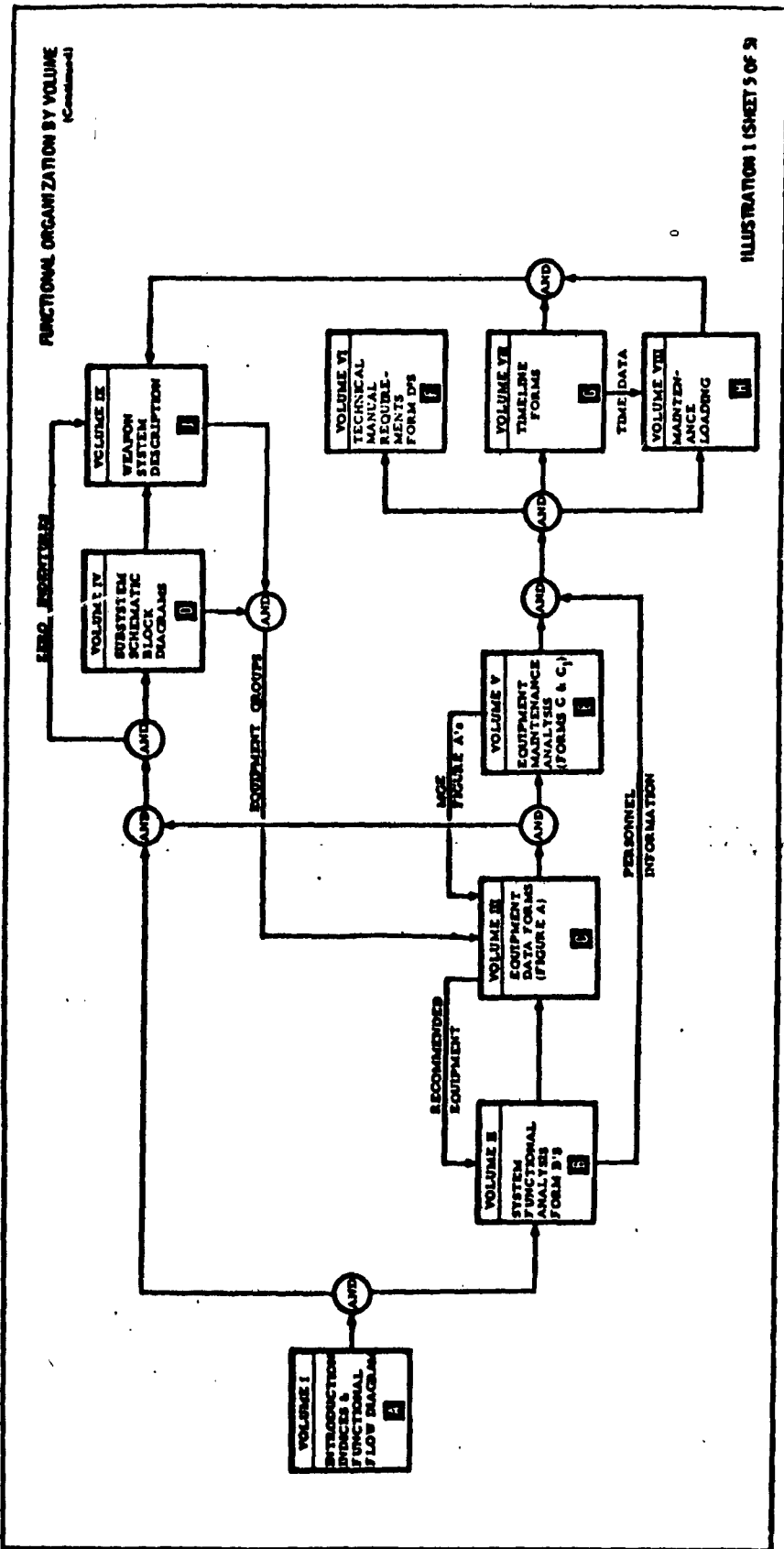
#### **(3) Facility Configurations**

- a. Launch Facility (LF)
- b. Launch Control Facility (LCF)
- c. Strategic Missile Support Base (SMSB)

The Weapon System Description serves as a "model" of the system operation and maintenance based upon Volumes I through VIII. Normally, pilot models are constructed to assist in the development and testing of complex systems. This is feasible for portions of a Weapon System but the total size and complexity rules out this approach for planning and verifying operation of the entire Weapon System. The prime purpose of the Weapon System Description is to provide a single means to verify the operating theory for all elements from SAC through the NAF, WCP, ACP, SCP, LCF, LF, SMSB and Depot. The system ANALYTICAL MODEL will contain basic requirements, concepts, ground rules and assumptions used by the associates in developing their subsystems. It also will contain current descriptions (drawings and text) of the Weapon System operation and configuration.

Secondary objectives are:

- (1) To assist in the review of individual hardware by identifying how and where individual hardware fits into the entire Weapon System operation.
- (2) Assist REACT
- (3) Assist CCB
- (4) To provide indoctrination tool, and
- (5) To assist Technical Order Writers.



FUNCTIONAL FLOW DIAGRAM TITLE

MAJOR FUNCTION NO.		PERSONNEL INFORMATION		1	NAME AND NO.	(Function Block Title and Number)
		C		2	TECHNICAL REQUIREMENTS	(Design requirements, limitations, and essential operating characteristics which the function imposes on the equipment. For functions with critically code of "R" or "C" the nature of and/or reason for criticality is stated.)
		RECOMMENDED EQUIPMENT		3	MAINTENANCE LOCATION AND CLASSIFICATION	(Maintenance location and classification)
		PERFORMANCE		4	CRITICALITY OF FUNCTION, IN TERMS OF SYSTEM OPERATIONS - A - least C - most	
		FACILITIES, EQUIPMENT (MPE) AND ARCHITECTURAL & ENGINEERING REQUIREMENTS		5	TIME REQUIRED TO PERFORM EACH FUNCTION	(Time required to perform each function.)
T		T		6	SHORT-TERM NOMENCLATURE	(Short form nomenclature of the item recommended to meet each technical requirement)
F		F		7	FIGURE A OR INDEX NUMBER CORRESPONDING TO ITEM LISTED UNDER NOMENCLATURE	(Figure A or index number corresponding to item listed under nomenclature)
P		P		8	PERIODICITY	(Frequency of indicated function/task in H-hours, M-months, or Y-years)
S		S		9	TEAM CODE	(Team Code)
C		C		10	CLOCK HOURS REQUIRED TO ACCOMPLISH THE FUNCTION/TASK	(Clock hours required to accomplish the function/task)
A		A		11	AVIATION SPECIALTY CODE FOR PERSONNEL RECOMMENDED TO ACCOMPLISH THE FUNCTION/TASK	(Aviation specialty code for personnel recommended to accomplish the function/task)
T		T		12	PERSONNEL ACTIONS REQUIRED FOR ACCOMPLISHMENT OF THE INDICATED FUNCTION	(Personnel actions required for accomplishment of the indicated function)

FLOW DIAGRAM TITLE

FLOW DIAGRAM NO.

FORM B  
2-3334-2FORM B  
ILLUSTRATION 2

ORIGINAL DATE

REVISION DATE

REV SYM

C

D2-30044-1A

REV

1

1

1

1

1

1

1

1

1

1

1



FORM C  
2-6000-1

FIG. A NOMENCLATURE \_\_\_\_\_ FORM C FOR PG. A NO. \_\_\_\_\_



FORM C<sub>1</sub> FOR FIG. A NO. \_\_\_\_\_

PERSONNEL INFORMATION		15101 1000 0001	Special skills Required in _____ the task.	2	SHEET
		1100 0000	Criticality of task performance in relation to regulations, (1, least = 1, most)		
		1000 00 00	Number of personnel required to accomplish the function/task.		
		10000 00000	Class of personnel required to accomplish the function/task (fractals are given in tenths as a hundredth).		
		10000	Team _____		
		APR	Air Force Specialty Code for the personnel recommended to accomplish the function/task.		
FUNCTION TASK		Personnel tasks recommended for the indicated function.			
FACILITIES EQUIPMENT (AND ARCHITECTURAL & ENGINEERING REQUIREMENTS)		Facilities requirements resulting from function being analysed, from facility criteria, or from the design described in the Figure A.			MAINTENANCE REQUIREMENTS
EQUIPMENT EQUIPMENT		Figure A or Index number corresponding to item listed under nomenclature.			
EQUIPMENT EQUIPMENT		Short form nomenclature of the item of equipment recommended to meet each technical requirement.			CONTRACT NO.
TECHNICAL REQUIREMENTS		MAINTENANCE FUNCTION			MAINTENANCE SYSTEM
EQUIPMENT Nomenclature		Entries in this column correspond to one of the twelve Maintenance functions listed in Column 6 of Form C (e.g., Test, Calibrate, Handle etc).			MAINTENANCE DATA
EQUIPMENT Nomenclature		Entries in this column correspond to the System/Equipment on the horizontal line of the Form C.			MAINTENANCE DATA
EQUIPMENT Nomenclature		Entries in this column correspond to the horizontal line number on the Form C.			MAINTENANCE DATA

FORM C<sub>1</sub>  
ILLUSTRATION 4 (SHEET 2 OF 2)

FORM C<sub>1</sub> FOR FIG. A NO. \_\_\_\_\_

FORM C<sub>1</sub>  
ILLUSTRATION 4

REVISION DATE \_\_\_\_\_

REV SYM C

REVISED D2-30044-1A  
SEC I 100 10

## TECHNICAL MANUAL REQUIREMENTS FORM

(1) CONTRACTOR		(2)		(3) AT CONTRACT NO.		(4) NUMBER	
PUBLICATION TO BE CHANGED (5)		TITLE		ESTIMATED CHANGE PAGES		ESTIMATED COST	
NEW BASIC PUBLICATION (6)		PROPOSED TITLE		SPECIFICATION		ESTIMATED PAGES	
MANUAL TYPE						ESTIMATED COST	

REQUIREMENTS	
(1) Model designator (e.g. SM-80C).	(7) Summary of Form B and/or Form C functional requirements to be covered in technical manual.
(2) Prepared by.	(8) Specific Form B and/or Form C functions.
(3) Applicable contract number.	(9) Key milestone establishing technical manual availability.
(4) Equipment or component vendor.	(10) Effectivity by Wing (e.g. Wing VI).
(5) Recommendation to revise existing technical manual, leave line (6) blank.	(11) Date of original preparation.
(6) New technical manual required, leave line (5) blank.	(12) Date of current revision.
	(13) Assigned control number.
REFERENCES (8)	

FORM D  
ILLUSTRATION 5

REQUIRED AVAILABILITY DATE (9)	EFFECTIVITY (10)	DATE PREPARED (11)	DATE REVISED (12)	FORM NUMBER (13)
--------------------------------	------------------	--------------------	-------------------	------------------

5.

**NO D2-30044-1A**

SEC I PAGE 12

2-6834-3-1

**JOB OPERATION**

(2)

TIME LINE NUMBER

(1)

91

REV SYM C

BOEING

NO D2-30044-1A

SEC I

PAGE 13

## MAINTENANCE SUMMARY AND CORRELATION FORM

(1) LOCATION - SUPPORT BASE - D1

(2) TYPE OF MAINTENANCE - UNSCHEDULED

(3) OPERATION	SOURCE (4) OF	REQD. JOB (5) OPER PER MONTH	MIN ELAPSED TIME (6) PER MONTH	MIN DOWN (7) TIME PER MONTH	NUMBER (8) OF PEOPLE + AFSC	FIGURE A NO.	INDEN LEVEL	NOMENCLATURE	(9) SPARES USED IN JOB OPERATION	(10) MGE USED IN JOB OPERATION

PERFORM MAINTENANCE  
ON EXPLOSIVE TEST SET

.58

1.37

001

1-31255 G

## EXAMPLE ONLY

- (1) Area and location, location code from Form B or Form C
- (2) Scheduled or unscheduled as applicable.
- (3) Job operation from timeline.
- (4) Form B, Form C, or Timeline number.
- (5) From fault matrix or Form C failure rates.
- (6) End to end loop time, mean time entry or from timeline (hours).
- (7) Missile not available for operational use (hours).
- (8) AFSC & no. of personnel required to perform job operation from Form B's and Form C's.
- (9) Spares list required for job operation.
- (10) MGE required to perform job operation.

(10) MGE USED IN JOB OPERATION

NOMENCLATURE

FIGURE A

TEST SET, EXPLOSIVE SET, CIRCUITRY

MULTIMETER

# MAINTENANCE LOADING SUMMARY AND CORRELATION FORM ILLUSTRATION 7

17

MGE MATRIX FORM				MIN		COMMITTED		QUANTITY	
MGE FIGURE A (1) NUMBER	(2) NOMENCLATURE	USE BY (3) FIGURE A	USE BY JOB (4) OPERATION (5) LOCATION	TIME (6) HR/MO (7) MONTH	TIME-DAYS/ (8) 9412/REC/MT	(9) 9412/REC/MT	(10) 9412/REC/MT	(11) 9412/REC/MT	(12) 9412/REC/MT
4059 6A	SEMITRAILER, TRANSPORTER-ERECTOR	102 6A	PREVENTIVE MAINTENANCE	LCF LF SMASB	1.43	1.43	1-		
4075 6A	TRUCK, TRACTOR, TRANSPORTER-ERECTOR	102 6A	PREVENTIVE MAINTENANCE	LCF LF SMASB	1.43	1.43	1-		
4078 6A	CARRIAGE, ROCKET MOTOR, 1ST STAGE	102 6A	PREVENTIVE MAINTENANCE	LCF LF SMASB	1.43	1.43	1-		
EXAMPLE ONLY									

(1) Figure A number for each MGE line entry.

(2) Nomenclature for each line entry.

(3) Figure A number of system or equipment requiring maintenance.

(4) Job operation from respective timeline.

(5) Location of maintenance.

(6) In-Use time for on-site maintenance equals FAILURE RATE X (LOOP TIME - INACTIVE TIME).

(7) In-Use time for Support Base and RPTIE scheduled maintenance is derived from Form C data.

(7) Time-days/month equals COMMITTED TIME X FAILURE RATE summed for all job operations which are logged against item (1).

(8) Three part entry consisting of:  
 (a) Analytical quantities from SRA.  
 (b) Booking recommended quantities based on cost studies of fault reporting system loading.  
 (c) Filled in by BSD/STL/SAC/OOAMA review team only.

EQUIPMENT MATRIX  
ILLUSTRATION 8

EQUIPMENT SUMMARY CHART

(1) MGE FIGURE A NUMBER	(2) NOMENCLATURE	(3) TOTAL HOURS	(4) LCF/LP HOURS	(5) SUPPORT BASE HOURS	(6) 9412C QUANTITY	(7) BOEING RECOMMENDED QUANTITY	(8) RET	(9) REMARKS
4271 6A	COVER, ENVIRONMENTAL, TRANSPORTER - ERECTOR	1052.56	435.93	5.29	LP/LCF- 2 SMSB- 1			
4278 6A	SHELTER, ENVIRONMENTAL, TRANSPORTER- ERECTOR TO LAUNCHER	225.94	225.94		LP/LCF- 1 SMSB- 1			
4280 6A	POSITIONING KIT, CARRIAGE ROCKET MOTOR	225.94	225.94		LP/LCF- 1 SMSB- 1			
4285 6A	HEATER, DUCT TYPE, PORTABLE	839.70	635.92		LP/LCF- 3 SMSB- 1			
4305 6A	CYLINDER/VALVE COMPRESSED GAS	1256.33	435.93	5.28	LP/LCF- 2 SMSB- 1			

EXAMPLE ONLY

- (1) Figure A number for item of support listed.  
 (2) Nomenclature of Figure A.  
 (3) Sum of utilization hours, per month from MGE matrix.  
 (4) Sum of LP/LCF hours utilization per month from MGE matrix.  
 (5) Total hours usage at support base from MGE matrix.  
 (6) Analytical quantities, prefixed by area code.  
 (7) Quantities based upon cost studies of fault reporting system loading.  
 (8) To be filled in by BSD/STL/SAC/OOAMA Review team only.  
 (9) As required to clarify entries.

# EQUIPMENT SUMMARY ILLUSTRATION 9

**D. DOCUMENT UPDATING**

1. Revisions (partial or complete) will be issued on a timely basis to maintain this Document Series current with respect to the analysis effort.
2. Generally, all data, including initial release, submitted to BSD/STL for review and approval prior to incorporation into this document. Exceptions may be made in certain cases on Boeing data, and shall be so noted.
3. Data will be added in logical packages as developed and approved.

**E.****GLOSSARY OF ABBREVIATIONS**

<b>AFSC</b>	<b>Air Force Speciality Code or Air Force Systems Command</b>
<b>AGC</b>	<b>Aerojet General</b>
<b>AGE</b>	<b>Aero-Space Ground Equipment</b>
<b>AMA</b>	<b>Air Material Area</b>
<b>AN.</b>	<b>Autonetics</b>
<b>ATC</b>	<b>Air Training Command</b>
<b>AV</b>	<b>Avco</b>
<b>AVE</b>	<b>Aero-Space Vehicle Equipment</b>
<b>BOEING</b>	<b>The Boeing Company</b>
<b>BSD</b>	<b>Ballistic Systems Division</b>
<b>CEP</b>	<b>Circle of Equal Probability</b>
<b>CFE</b>	<b>Contractor Furnished Equipment</b>
<b>C/O</b>	<b>Checkout</b>
<b>DT &amp; TE</b>	<b>Depot Tooling and Test Equipment</b>
<b>G&amp;C</b>	<b>Guidance and Control</b>
<b>GES</b>	<b>Ground Electronics System</b>
<b>GFE</b>	<b>Government Furnished Equipment</b>
<b>GFP</b>	<b>Government Furnished Property</b>
<b>HPC</b>	<b>Hercules Powder Company, Magna, Utah</b>
<b>LCF</b>	<b>Launch Control Facility</b>
<b>MAMS</b>	<b>Missile Assembly and Maintenance Shops</b>
<b>MCC</b>	<b>Mobile Launch Control Center</b>
<b>MGE</b>	<b>Maintenance Ground Equipment</b>
<b>MLCC</b>	<b>Mobile Launch Control Center</b>
<b>NA</b>	<b>Not Applicable</b>
<b>OGE</b>	<b>Operational Ground Equipment</b>



E. (Continued)

PA	Penetration Aids
PAS	Primary Alert System
PROP	Propulsion
RFI	Radio Frequency Interference
RPIE	Real Property Installed Equipment
R/V	Re-entry Vehicle
SAC	Strategic Air Command
SMSB	Strategic Missile Support Base
STL	Space Technology Laboratories, Inc.
SYL	Sylvania
SYL (W)	Sylvania (West)
TAPS	Trajectory Accuracy Prediction System
TCC	Thiokol Chemical Corporation
T-R	Transformer - Rectifier
VAFB	Vandenberg Air Force Base
W/S	Weapon System

## F. VOLUME INDEX

### NOTE

All Volumes in the S-133-10 series are identified by a Boeing document number. The base portion of this number is D2-30044-. To obtain a given volume, add the volume number to the base number. (e.g. Volume 3A is Document No. D2-30044-3A).

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## USAGE INDEX

### A PURPOSE

To provide a means for rapid location and identification of data contained in the Requirements and Description Document.

### B SCOPE

Entries to the usage index are alphabetically arranged to define and reference information by subject title. Information common to several forms, but having little or no subjective importance has been omitted. Example: Figure A number references appear on the Forms B, C, C<sub>1</sub> and Maintenance Loading Forms. Since a detailed description of the form entries is presented in the introduction to each volume, the location of each Figure A reference is superfluous. The usage index will be revised as necessary to reflect changes to the scope and direction of the analysis.

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$$\frac{A \times B \times C}{140}$$

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